CLAIMS

What is claimed is:

1. A sensor device comprising:

a support structure;

a sensing element mounted on said support substrate for sensing optical radiation and generating an electrical output signal in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element.

2. The sensor device of claim 1, wherein said support structure is a portion of a lead frame.

3. The sensor device of claim 2, wherein said portion of the lead frame includes at least two leads electrically coupled to said sensing element, and wherein said leads are retained by said encapsulant.

4. The sensor device of claim 1, wherein said lens portion is elliptical.

5. The sensor device of claim 4, wherein the major axis of said elliptical lens portion is aligned with the optical axis of the sensor device.

6. The sensor device of claim 5, wherein said optical radiation collecting portion includes a parabolic surface.

7. The sensor device of claim 6, wherein said parabolic surface redirects incident optical radiation towards said sensing element by total internal reflection.

8. The sensor device of claim 7, wherein said optical radiation collecting portion includes an annular light receiving surface that lies in a plane perpendicular to the major axis of said elliptical lens portion and is disposed around said elliptical lens portion.

9. The sensor device of claim 1, wherein said light collecting portion includes a parabolic surface.

10. The sensor device of claim 9, wherein said parabolic surface redirects incident optical radiation towards said sensing element by total internal reflection.

11. The sensor device of claim 1, wherein said sensing element is sensitive to visible light.

12. The sensor device of claim 1, wherein said sensing element comprises:

a light transducer exposed to light, the light transducer operative to accumulate charge in proportion to light incident over an integration period; and

a sensor logic circuit in communication with the exposed light transducer, the sensor logic circuit operative to output a discrete light signal according to the accumulated exposed light transducer charge.

13. The sensor device of claim 12, wherein said light collecting portion includes a parabolic surface.

14. The sensor device of claim 12, wherein said integration period is variable in response to a received integration signal.

15. The sensor device of claim 12, wherein the integration period is of a length of time that is predetermined prior to accumulation of charge during the integration period.

16. The sensor device of claim 1, wherein said encapsulant is made of an epoxy.

17. A sensor assembly comprising:

a housing having an aperture;

a diffusing element positioned across said aperture; and

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical signal in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define an optical radiation collector portion having a parabolic reflecting surface for collecting and redirecting incident optical radiation towards said sensing element by total internal reflection.

18. The sensor assembly of claim 17, wherein said encapsulant being further configured to define a lens portion centrally located within said optical radiation collector portion for focusing incident optical radiation onto an active surface of said sensing element.

19. The sensor assembly of claim 18, wherein said lens portion is elliptical.

20. The sensor assembly of claim 19, wherein the major axis of said elliptical lens portion is aligned with the optical axis of the sensor device.

21. The sensor assembly of claim 20, wherein the optical axis of the sensor device is aligned with the center of said aperture.

22. The sensor assembly of claim 17, wherein said support structure is a lead frame having at least first and second electrical leads electrically coupled to said sensing element.

23. The sensor assembly of claim 22, wherein said sensing element is mounted on one of said first and second electrical leads.

24. The sensor assembly of claim 23 and further including a wire bond extending from one of said first and second electrical leads to said sensing element.

25. The sensor assembly of claim 17, wherein the diffusing element is used to characterize the field of view.

26. The sensor assembly of claim 25, wherein the diffusing element is further characterized so that the expanse of the field of view is greater in one direction than in another.

27. A vehicle accessory for mounting in a vehicle, said vehicle accessory comprising:

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing

incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident the lens portion onto the active surface of said sensing element.

28. The vehicle accessory of claim 27, wherein the vehicle accessory is a rearview mirror assembly.

29. The vehicle accessory of claim 28, wherein the mirror is an electrochromic mirror.

30. The vehicle accessory of claim 29 and further comprising a processing circuit coupled to said sensor device for controlling said electrochromic mirror in response to light levels sensed by said sensing element.

31. The vehicle accessory of claim 30, wherein said sensor device is aimed forward of the vehicle for sensing ambient light levels.

32. The vehicle accessory of claim 30, wherein said sensor device is aimed rearward of the vehicle for sensing glare.

33. The vehicle accessory of claim 30 and further comprising a second sensor device for sensing light levels from sources in a different field of view from the first sensor device.

34. The vehicle accessory of claim 33, wherein said second sensor device comprises:

a support structure;

a sensing element mounted on the support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident the lens portion onto the active surface of said sensing element.

35. The vehicle accessory of claim 30, wherein said processing circuit is further configured to generate light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

36. The vehicle accessory of claim 28 and further comprising a processing circuit coupled to said sensor device for generating light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

37. The vehicle accessory of claim 27 and further comprising a processing circuit coupled to said sensor device for generating light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

38. The vehicle accessory of claim 37, wherein said at least one vehicle light includes vehicle headlamps and said processing circuit controls the on/off state of the vehicle headlamps.

39. The vehicle accessory of claim 37, wherein said at least one vehicle light includes interior display lights.

40. The vehicle accessory of claim 27 and further comprising a processing circuit coupled to said sensor device for generating windshield wiper control signals to control windshield wipers of the vehicle in response to light levels sensed by said sensing element.

41. The vehicle accessory of claim 27 and further comprising a processing circuit coupled to said sensor device for generating climate control signals to control a climate control system of the vehicle in response to light levels sensed by said sensing element.

42. The vehicle accessory of claim 41, wherein said sensor device is positioned to sense sun loading on the vehicle.

43. A vehicle accessory for mounting in a vehicle, said vehicle accessory comprising:

a housing having an aperture;

a diffusing element positioned across said aperture; and

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical signal in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define an optical radiation collector portion having a parabolic reflecting surface for collecting and redirecting incident optical radiation towards said sensing element by total internal reflection.

44. A sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant including an integral lens for directing incident optical radiation toward said sensing element; and

a light collector surrounding the integral lens for collecting and redirecting optical radiation that is not incident the lens onto the active surface of said sensing element.